



Designation: E2189 – 02

Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units¹

This standard is issued under the fixed designation E2189; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers procedures for testing the resistance to fogging of preassembled permanently sealed insulating glass units or insulating glass units with capillary tubes intentionally left open.

1.2 This test method is applicable only to sealed insulating glass units that are constructed with glass.

1.3 The unit construction used in this test method contains construction details that are essential components of the test. Different types of glass, different glass thicknesses and different airspace sizes may affect the test results.

1.4 This test method is not applicable to sealed insulating glass units containing a spandrel glass coating due to testing limitations.

1.5 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[C162 Terminology of Glass and Glass Products](#)³

[C717 Terminology of Building Seals and Sealants](#)⁴

[E631 Terminology of Building Constructions](#)⁵

[E2188 Test Method for Insulating Glass Unit Performance](#)⁵

¹ This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.22 on Durability Performance of Building Constructions.

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² *Annual Book of ASTM Standards*, Vol 15.02.

³ *Annual Book of ASTM Standards*, Vol 04.07.

⁴ *Annual Book of ASTM Standards*, Vol 04.11.

⁵ *Annual Book of ASTM Standards*, Vol 04.12.

[E2190 Specification for Insulating Glass Unit Performance and Evaluation](#)

3. Terminology

3.1 *Definition of Terms:*

3.1.1 For definitions of terms found in the standard, refer to Terminology [C717](#), Terminology [C162](#) and Terminology [E631](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *fog, n*—visible deposits present after testing in accordance with Section 8.

4. Significance and Use

4.1 This test method is intended to provide a means for testing the resistance to fogging in sealed insulating glass units.

4.2 This test method is also intended to provide a means for testing the resistance to fogging caused by components in the interior of the unit. These interior components include, but are not limited to, suspended or applied films, decorative components, muntins, and coatings.

5. Test Specimens

5.1 Each test specimen shall be manufactured in accordance with Test Method [E2188](#), Section 5 or Specification [E2190](#), Section 5, or both.

5.2 For double-glazed units, at least three specimens of identical component materials and construction shall be submitted.

5.3 For triple-glazed units, at least five specimens of identical component materials and construction shall be submitted. For these units, the manufacturer must specify the exterior surface.

NOTE 1—Certain reflective coatings may interfere with the ability to view fog.

5.4 During all stages of storage and handling, the units shall be held in a vertical position with equal support to all panes and no compression loading.

5.5 Two units shall be randomly selected for this test. Damaged units shall not be tested.

6. Apparatus

6.1 Volatile Fog Test Apparatus:

6.1.1 The dimensions and components are found in Fig. 1. The construction of the apparatus shall be capable of maintaining $50 \pm 3^\circ\text{C}$ ($122 \pm 5^\circ\text{F}$). In order to maintain this temperature, a fan shall be mounted in the box. The fan shall run continuously.

6.1.2 The apparatus shall be constructed from sturdy, solid materials that minimize the escape of ultraviolet light into the surrounding area. $\frac{1}{2}$ or $\frac{3}{4}$ in. plywood has been found suitable for this purpose. Stainless steel construction is also acceptable.

6.1.3 The interior of the apparatus shall have a reflective surface. If plywood is used to construct the apparatus, then line the entire interior of the apparatus with aluminum foil or other reflective material.

6.1.4 The test specimen supports are located as shown in Fig. 1.

6.1.5 The cooling plates are constructed of a conductive material such as copper or brass. The cooling plates shall be nominally 150 ± 5 mm (5.91 ± 0.20 in.) diameter and shall be placed directly in complete contact with the glass surface for the duration of the test. Alternatively, a rectangular cooling plate shall be 0.0177 ± 0.0006 m² (27.4 ± 1.0 in.²) in area.

6.1.6 The cooling water temperature is determined as the water immediately exits the apparatus from each cooling plate as shown in Figure 1. The cooling water temperature at these locations shall be $21 \pm 2^\circ\text{C}$.

6.2 Ultraviolet Light Source:

NOTE 2—Warning: Ultraviolet light sources used in this test method are harmful to the human body, especially to the eyes. Appropriate

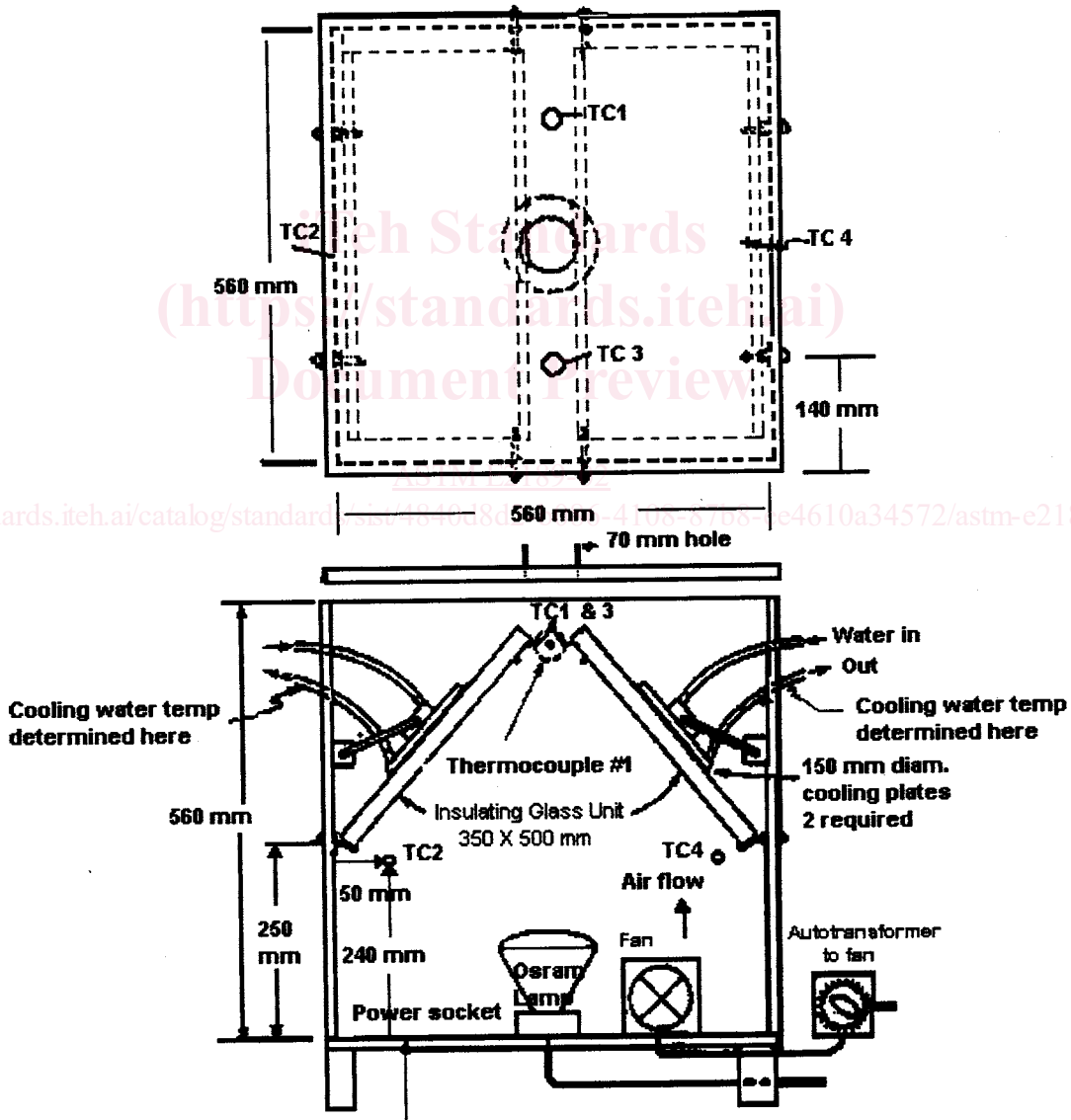


FIG. 1 Volatile Fogging Exposure Box